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August 21, 2023

Public Utility Commission of Texas
Interim Chairman, Kathleen Jackson
Commissioner Will McAdams
Commissioner Lori Cobos
Commissioner Jimmy Glotfelty
1701 N. Congress Avenue
Austin, TX 78711

Re: Project No. 53298, *Wholesale Electric Market Design Implementation*
Project No. 55156, *Implementation Activities 88th Legislature*

Dear Chairman and Commissioners:

As requested at the July 20, 2023 Open Meeting, Electric Reliability Council of Texas, Inc. (ERCOT) submits the attached overviews detailing the following market enhancement initiatives: establishment of the Dispatchable Reliability Reserve Service (DRRS), development of the Performance Credit Mechanism (PCM), implementation of a multi-step floor to the Operating Reserve Demand Curve (ORDC), and implementation of Real-Time Co-optimization (RTC).[1] Each overview presents the following information:

- the history and background of the initiative,
- the scope of the initiative's framework,
- key milestones proceeding from the development stage through approval,
- implementation and evaluation, and
- if applicable, a section containing current updates to provide the latest developments.

A diagram is also included in each overview to show these initiatives' respective development in a visual timeline. Following coordination with Commission Staff, these timelines present ERCOT's current estimate of the anticipated timeframes to develop and implement each initiative, which may subsequently be revised as the initiatives unfold. ERCOT will continue to coordinate with Commission Staff and intends to maintain these overviews throughout the initiatives' development and file periodic updates.

[1] Pursuant to 16 TEX. ADMIN. CODE § 22.71(i)(2)(C), this filing is submitted less than seven days in advance of the August 24, 2023 Open Meeting due to market initiative overview revisions based on recent developments with these initiatives and is filed presently in order to ensure that the Commission has the most current information for consideration at the meeting.

ERCOT has also been examining a variety of visual techniques to represent development process flows for these market initiatives. An additional flow chart is attached as an example of one of the formats being assessed. ERCOT will analyze this and other options on the added value.

ERCOT appreciates any feedback that the Commission may have on these market initiative overviews at the August 24, 2023 Open Meeting.

Respectfully submitted,

/s/ Chad Seely

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Market Initiative: Dispatchable Reliability Reserve Service (DRRS)

Background

Section 22 of House Bill (HB) 1500 (88th Leg.) requires ERCOT to develop and implement a DRRS Ancillary Service by December 1, 2024.

- In June 2023, ERCOT internally evaluated possible options to develop DRRS that could meet the stuatutory deadline. These consisted of development of an entirely new Ancillary Service, an option to alter the existing Non-Spinning Responsive Reserve (Non-Spin) into DRRS, or an option to add a DRRS sub-type to Non-Spin. The first option would not be deliverable by December 1, 2024, but either of the adaptations of Non-Spin could be.
- Non-Spin is currently provided by resources that can be deployed within 30 minutes and could either be replaced by DRRS or supplemented with a new subtype that would utilize off-line resources that can come online in more than 30 minutes but less than or equal to two hours and that can sustain deployment for at least four hours.
- At the Commission's June 29, 2023 Open Meeting, the Commission directed ERCOT to continue engaging stakeholders on DRRS implementation options with a focus on establishment of a new sub-type of Non-Spin.
- In July, ERCOT held a public workshop seeking input on DRRS options and providing further information on establishing a DRRS sub-type of Non-Spin. ERCOT has continued to engage with stakeholders and solicit feedback.

The DRRS initiative fulfills a statutory mandate to create an Ancillary Service to address market uncertainty cause by variations in generation availability.

Scope

This market initiative will implement a new sub-type of the Non-Spin Ancillary Service in order to support system reliability while mitigating the use of Reliability Unit Commitment (RUC). This meets the requirements of HB1500 for DRRS while being deliverable within the statutory timeframe.

- Public Utility Regulatory Act § 39.159(d) requires that DRRS include the following characteristics:
  - DRRS must be an Ancillary Service procured on a day-ahead and real-time basis to account for market uncertainty.
  - The necessary quantity of DRRS must be determined based on historical variations in generation availability each season based on a targeted reliability standard or goal.
  - RUC must be reduced by the amount of DRRS procured.
  - Resources eligible to provide DRRS must: (1) be capable of running for at least four hours at their high sustained limit, (2) be online and dispatchable not more than two hours after being called on for deployment, and (3) have dispatchable flexibility to address inter-hour operational challenges.
- ERCOT will intiate Protocol amendments to establish DRRS and develop an Impact Analysis (IA) to evaluate estimated costs and budget impacts for the implementation as well as any potential impacts to systems and grid operations.

- Protocol amendments at ERCOT are evaluated through a robust stakeholder process prior to evaluation by the ERCOT Board of Directors (ERCOT Board). This includes review by the Technical Advisory Committee (TAC), which includes consumer and industry representatives. All ERCOT Protocol amendments are reviewed and approved by the Commission.
- At six months and/or one year after DRRS implementation, ERCOT will provide a performance report to the Commission assessing the impacts on the use of RUC for capacity and on additional revenues resulting from the ORDC price floors by Resource type.

Key Milestones[1]

Development stage

- **June 2023** ERCOT identified three concepts for potential DRRS development options and presented these to TAC on June 27. Evaluation focused on solutions that met the statutory criteria for the Ancillary Service and that could be implemented by the statutory deadline of December 1, 2024. At the June 29 Open Meeting, ERCOT presented these options to the Commission and received direction to focus on the option to create a new sub-type of Non-Spin.
- **July - August 2023** ERCOT continued to engage with stakeholders to ensure that all potential DRRS implementation options were being considered and to refine the Commission's preferred option for DRRS as a sub-type of Non-Spin, including through a workshop on July 27, 2023.
- **September - November 2023** ERCOT will file Nodal Protocol Revision Request(s) (NPRR) through the stakeholder process to codify the creation of the DRRS sub-type of Non-Spin in the ERCOT Protocols. ERCOT will perform an IA identifying cost, resource, and system impacts.

Approval stage

- **December 2023** NPRR and Impact Assessment will be presented to the ERCOT Board to evaluate and recommend to the Commission.
- **January 2024** The NPRR will be presented to the Commission at the January Open Meeting(s) for review and potential approval.

Implementation stage

- **February – November 2023** Upon Commission approval, ERCOT personnel will implement system changes to facilitate the operation and settlement of the DRRS Ancillary Service by December 1, 2024. ERCOT will periodically report on the progress of such system changes to the Commission, the ERCOT Board, and stakeholder committees.

Evaluation stage

- **2025** ERCOT will provide analysis for evaluation of DRRS after implementation.

[1] Projected milestones are subject to change.

Key Documents and References

Texas State Leadership

- HB 1500 § 22 (88th Leg.)
- Public Utility Regulatory Act § 39.159(d), (e)

Commission

- PUCT Project No. 55156
  - ERCOT Report to Commission on DRRS implementation options (June 26, 2023)
  - Commission Staff Memo relating to prioritization of projects to implement legislation passed during the 88th Legislative Session and recommending that no rulemaking is necessary for DRRS (July 18, 2023)
  - ERCOT Report in response to the June 29, 2023 Open Meeting addressing timeline next steps for DRRS implementation (July 19, 2023)

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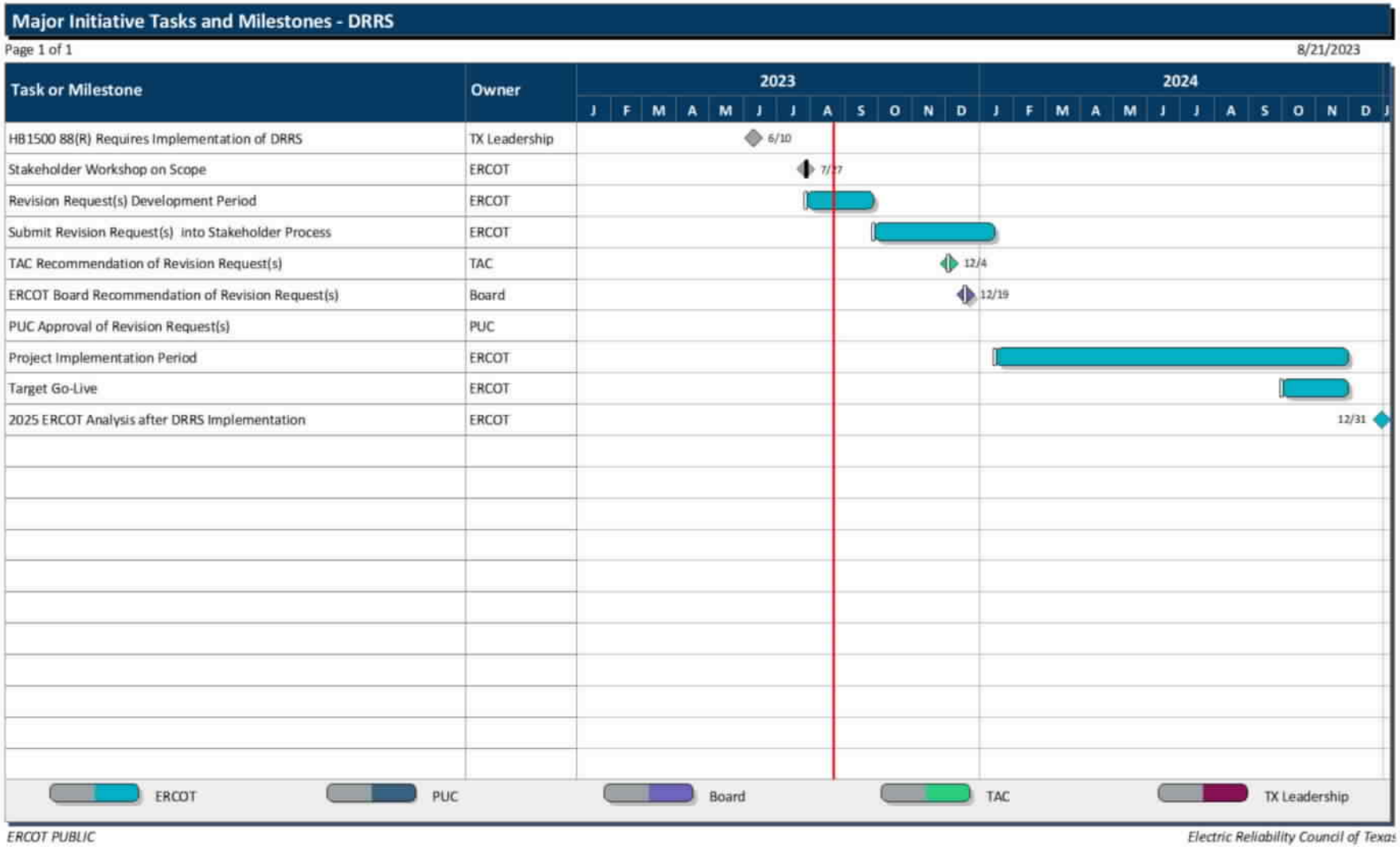
- ERCOT Presentation to TAC raising urgency of DRRS development (June 27, 2023)
- ERCOT Workshop Presentation refining option for DRRS as a sub-type of Non-Spin (July 27, 2023)
- NPRR [XXXX] and IA: TBD

Timeline


Major Initiative Tasks and Milestones - DRRS
Page 1 of 1
8/21/2023
Task or Milestone
Owner
2023
2024
J F M A M J J A S O N D J F M A M J J A S O N D J
HB1500 88(R) Requires Implementation of DRRS
TX Leadership
6/10
Stakeholder Workshop on Scope
ERCOT
7/27
Revision Request(s) Development Period
ERCOT
Submit Revision Request(s) into Stakeholder Process
ERCOT
TAC Recommendation of Revision Request(s)
TAC
12/4
ERCOT Board Recommendation of Revision Request(s)
Board
12/19
PUC Approval of Revision Request(s)
PUC
Project Implementation Period
ERCOT
Target Go-Live
ERCOT
2025 ERCOT Analysis after DRRS Implementation
ERCOT
12/31
ERCOT
PUC
Board
TAC
TX Leadership
ERCOT PUBLIC
Electric Reliability Council of Texas

Market Initiative: Performance Credit Mechanism (PCM)

Background

Senate Bill (SB) 3 (87th Leg.) required the Public Utility Commission of Texas (Commission) to establish a reliability mechanism to meet the needs of the ERCOT power region.

- The Commission engaged with ERCOT and stakeholders through a series of work sessions and comment periods addressing different aspects of the wholesale electricity market.
- In December 2021, the Commission adopted a Blueprint establishing key principles for market reform focused on reliability, incentivizing dispatchable generation resources, and maintaining a competitive market. The Blueprint is a compilation of directives and concepts presented in two phases.
  - Phase I of the Blueprint directed ERCOT to amend current market features to enhance Ancillary Services and improve price signals.
  - Phase II of the Blueprint called for the study of specific long-term market design principles and directed ERCOT to work with Commission Staff to develop decision points.
- In June 2022, the Commission engaged Energy+Environmental Economics (E3) to study options for long-term reforms. E3 performed a qualitative and quantitative review on the range of market design options identified in Phase II.
- The E3 Report filed in November 2022 identified the PCM, a hybrid concept that Commission Staff determined fulfilled the SB 3 requirements to meet the reliability needs of the ERCOT region. Additional stakeholder feedback was received regarding the PCM and E3's analysis.
- In January 2023, the Commission issued an Order adopting a recommendation for a new service based on the PCM concept and delayed implementation pending consideration and direction from the 88th Texas Legislature. House Bill (HB) 1500 (88th Leg.) provided guidance for moving forward with PCM provided certain guardrail measures are maintained.

The PCM initiative supports the Commission's efforts to ensure resource adequacy and incentivize generation availability during the periods of highest need on the grid.

Scope

The PCM market initiative will implement a new credit-based resource adequacy program with clear performance standards for the ERCOT market. PCM will require substantial coordination between ERCOT and the Commission, especially during the development stage.

- The Commission has adopted a set of principles for the PCM and identified decision points warranting further Commission, ERCOT, and Independent Market Monitor (IMM) analysis.
- ERCOT is developing a framing document identifying the decision points where ERCOT action is needed and outlining the specific variables that must be defined at the onset of the project. Key decisions and definitions, such as the definition of scarcity hours, the number of hours, PCM performance periods, and non-performance ramifications, will be

further segmented into issues best decided in a Commission rulemaking and those that should be worked through the Technical Advisory Committee (TAC) at ERCOT.

- ERCOT will take Commission feedback on the framing document and begin development of a strawman proposal to address the parameters of PCM design. Development will include stakeholder workshops to receive input on initial design elements prior to filing the proposal with the Commission. Delivery of the strawman proposal will initiate multiple workstreams at the Commission and ERCOT.
- Per HB 1500, ERCOT and the IMM will complete an assessment of the costs of the PCM and its effects on the ERCOT market. The report will be submitted for Legislative and Commission review.
- The Commission will initiate a rulemaking to codify PCM principles and key parameters.
- ERCOT will develop Revision Requests for items that are to be evaluated through TAC and as directed by Commission rule. This will include an Impact Analysis (IA) to evaluate estimated costs and budget impacts related to the changes. The IA will determine any potential impacts to systems and grid operations.
- Protocol amendments at ERCOT are evaluated through a robust stakeholder process prior to evaluation by the ERCOT Board of Directors (ERCOT Board). This includes review by TAC, which includes consumer and industry representatives. All ERCOT Protocols are required to be reviewed and approved by the Commission.
- ERCOT will initiate a PCM program control project. The program will convert the Protocols into business requirements to implement the required system changes.
- ERCOT will provide regular updates on the PCM project to the Commission, Board, and TAC.

Key Milestones[1]

Development stage

- **August 2023** ERCOT is developing a framing document outlining outstanding PCM decision points based on the directives in the Commission's January 19th Order and HB 1500. The document will provide a level-set on PCM. ERCOT anticipates filing the framing document in late September 2023.
- **October 2023** ERCOT will provide an update on PCM at an Open Meeting and, pending Commission feedback, will move forward with development of a strawman proposal. The strawman is anticipated to address the parameters of PCM design and how ERCOT expects the PCM to work.
- **Q4 2023 – Q1 2024** ERCOT will host stakeholder workshops to discuss initial design elements.
- **Q1-Q2 2024** ERCOT will file the PCM proposal at the Commission and solicit stakeholder feedback. We anticipate hosting informational workshops and participating in Commission work sessions in Q1 and Q2 2024.

[1] Projected milestones are subject to change.

- **Q3-Q4 2024** ERCOT and the IMM will analyze the cost and market effects of the PCM proposal in parallel to the Commission's rulemaking process. Per HB 1500, the updated assessment will be provided to the Commission and Legislature. ERCOT anticipates direction through a Commission rule adopted by the end of 2024.

Approval stage

- **January 2025** Upon adoption of Commission rules regarding PCM, ERCOT will begin the Protocol development process. Protocol development is anticipated to take six to nine months. ERCOT will perform an IA to identify cost, resource, and system impacts for each Revision Request.
- **Q2-Q3 2025** PCM Protocol Revision Requests will be presented to the ERCOT Board to evaluate and recommend for Commission approval. The Commission will review the ERCOT Board recommendation.

Implementation stage

- **Q3 2025** Upon Commission approval, ERCOT will begin the project implementation stage for PCM and begin developing business requirements from the Protocols. Implementation is anticipated to take two years.

Key Documents and References

Texas State Leadership

- SB 3 § 18 (87th Leg.)
- HB 1500 § 23 (88th Leg.)

Commission

- PUCT Project No. 52373
  - Blueprint for Wholesale Electric Market Design and Directives to ERCOT (Jan. 13, 2022)
  - E3 Report on Assessment of Market Design Options (Nov. 10, 2022)
- PUCT Project No. 53298
  - Commission Order adopting the PCM (Jan. 19, 2023)

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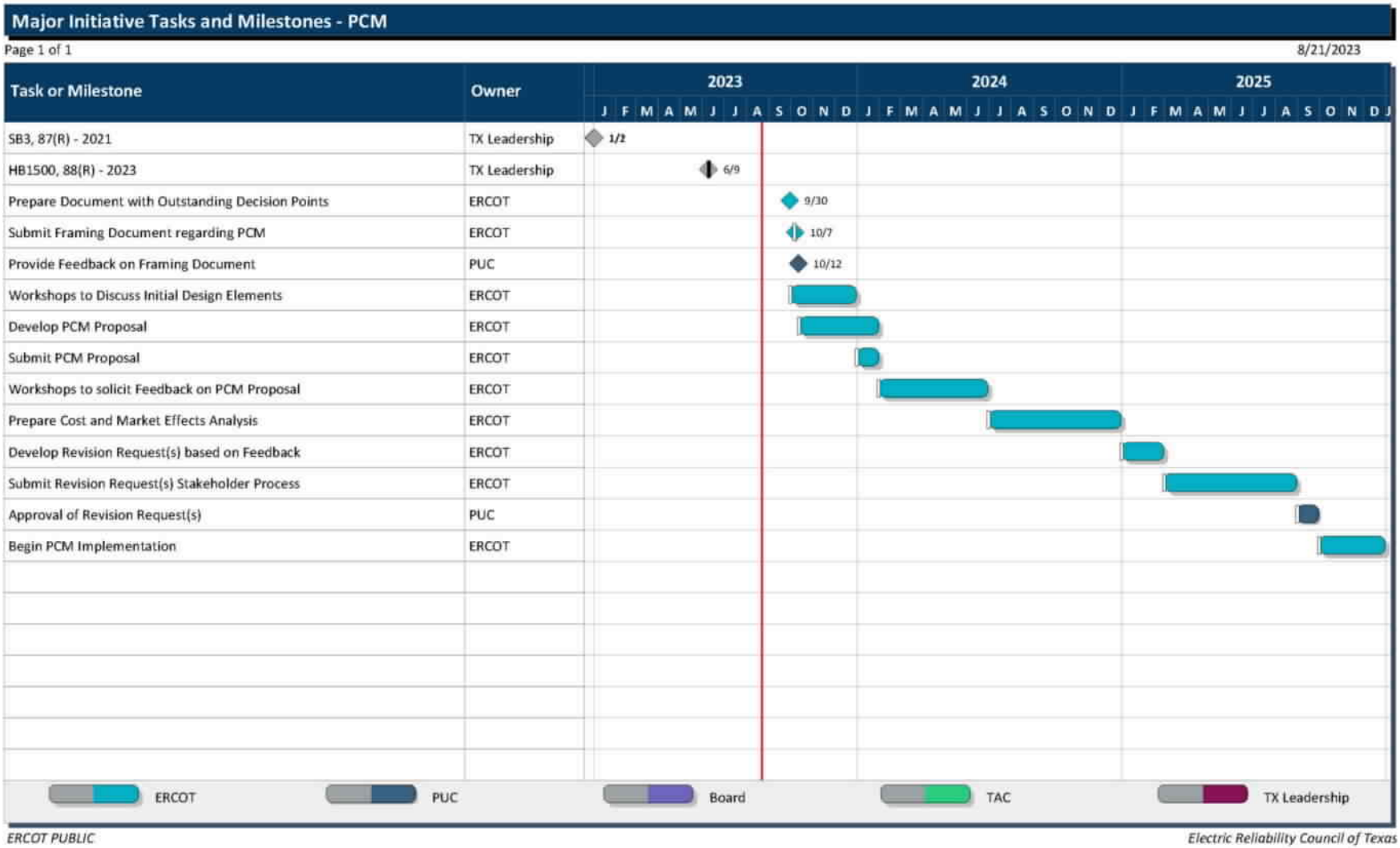
- PCM framing document (TBD)

Timeline


Major Initiative Tasks and Milestones - PCM
Page 1 of 1
8/21/2023
Task or Milestone
Owner
2023
2024
2025
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J
SB3, 87(R) - 2021
TX Leadership
1/1
HB1500, 88(R) - 2023
TX Leadership
6/9
Prepare Document with Outstanding Decision Points
ERCOT
9/30
Submit Framing Document regarding PCM
ERCOT
10/7
Provide Feedback on Framing Document
PUC
10/12
Workshops to Discuss Initial Design Elements
ERCOT
Develop PCM Proposal
ERCOT
Submit PCM Proposal
ERCOT
Workshops to solicit Feedback on PCM Proposal
ERCOT
Prepare Cost and Market Effects Analysis
ERCOT
Develop Revision Request(s) based on Feedback
ERCOT
Submit Revision Request(s) Stakeholder Process
ERCOT
Approval of Revision Request(s)
PUC
Begin PCM Implementation
ERCOT
ERCOT
PUC
Board
TAC
TX Leadership
ERCOT PUBLIC
Electric Reliability Council of Texas

Market Initiative: Operating Reserve Demand Curve (ORDC)

Background

Senate Bill (SB) 3 (87th Leg.) required the Public Utility Commission of Texas (Commission) to establish a reliability mechanism to meet the needs of the ERCOT power region.

- In January 2023, the Commission adopted a recommendation for a new reliability service based on the Performance Credit Mechanism (PCM) concept and directed ERCOT to evaluate bridging options to incentivize dispatchable generation until the PCM can be fully implemented.
- Internal evaluation of possible bridge solutions focused on retaining existing resources, incentivizing new dispatchable units, and reducing the need for Reliability Unit Commitment (RUC).
- ERCOT held a series of stakeholder meetings and public workshops seeking input on bridging options. The ERCOT Board of Directors (ERCOT Board) approved a resolution recommending an enhancement to the Operating Reserve Demand Curve (ORDC) as the preferred bridge in April 2023.
- In August 2023, the Commission directed ERCOT to implement ORDC enhancements as recommended by the ERCOT Board and provide metrics in the biennial performance report. The Commission expressed an intent to evaluate the continued need for the ORDC pricing floors following the implementation of Dispatchable Reliability Reserve Service (DRRS).

The ORDC initiative supports the Commission's work to implement a market-based reliability mechanism for the ERCOT power region.

Scope

The market initiative will implement a multi-step floor to On-Line ORDC price adders. The initiative is expected to provide targeted increases to Resource revenues.

- The first step of the floor at $10 per megawatt hour (MWh) would be in place when Operating Reserve levels are ≤ 7,000 megawatts (MW) and > 6,500 MW. The second step of the floor at $20 per MWh would be in place when Operating Reserves ≤ 6,500 MW.
- ERCOT initiated a Revision Request to establish ORDC pricing floors and developed an Impact Analysis (IA) to evaluate estimated costs and budget impacts related to the changes. The IA also assessed any potential impacts to systems and grid operations.
- Protocol and Other Binding Document (OBD) amendments at ERCOT are evaluated through a robust stakeholder process prior to evaluation by the ERCOT Board. This includes review by the Technical Advisory Committee (TAC), which includes consumer and industry representatives. All ERCOT Protocols and OBDs are required to be reviewed and approved by the Commission.
- ERCOT will provide an ORDC performance report to the Commission that includes metrics on the revenues resulting from the price floors, types of Resources that received the additional revenue, and impacts to the use of RUC for capacity.
- ERCOT will assist the Commission in its evaluation of ORDC following the implementation of DRRS.

Key Milestones[1]

Development stage

- **February 2023** ERCOT identified six initial concepts for potential bridge options. Evaluation focused on solutions that minimize distortions or other adverse consequences to the ERCOT market and that could be implemented quickly in a manner that would not interfere with implementation of the PCM.
- **March 2023** ERCOT engaged with stakeholders to refine options and understand the benefits of and concerns with each option through written comments and a series of workshops and special TAC meetings.
- **April 2023** ERCOT staff recommended that Concept 3, enhancements to the ORDC, best met the goals identified for a bridge solution. TAC endorsed Concept 3 with opposing votes from the Consumer Market Segment and two abstentions from the Cooperative and Independent Retail Electric Provider Market Segments.

Approval stage

- **April 2023** The ERCOT Board considered the bridge options and voted to approve a recommendation of Concept 3 as the preferred bridge solution. ERCOT filed the recommendation with the Commission.
- **August 2023** The Commission directed ERCOT to implement ORDC floors.

Implementation stage:

- **August 2023** ERCOT filed Other Binding Document Revision Request (OBDRR) 048 to proceed through the stakeholder process to codify the two-step price floor into the ERCOT OBDs. ERCOT performed an IA identifying cost, resource, and system impacts.
- **October 2023** OBDRR048 and the IA will be presented to the ERCOT Board to evaluate and recommend for Commission approval. The Commission will review the ERCOT Board's recommendation.
- **November 2023** Upon Commission approval, ERCOT will set the necessary configurable parameters within the software to implement the two-step ORDC floor for the identified go-live date.

Evaluation stage

- **November 2024** ERCOT will file first biennial ORDC report with performance metrics.
- **2025** ERCOT will provide analysis for evaluation of ORDC floors after DRRS implementation.

[1] Projected milestones are subject to change.

Key Documents and References

Texas State Leadership

- SB 3 § 18 (87th Leg.)
- Public Utility Regulatory Act § 39.159

Commission

- 16 Texas Administrative Code (TAC) § 25.505 (e)
- PUCT Project No. 53298
  - Commission Order directing ERCOT to evaluate bridging options (Jan. 19, 2023)
  - ERCOT Report to Commission on bridging solutions (Apr. 20, 2023)
  - Commission Staff Memo relating to implementation of ORDC price floors (Aug. 3, 2023)

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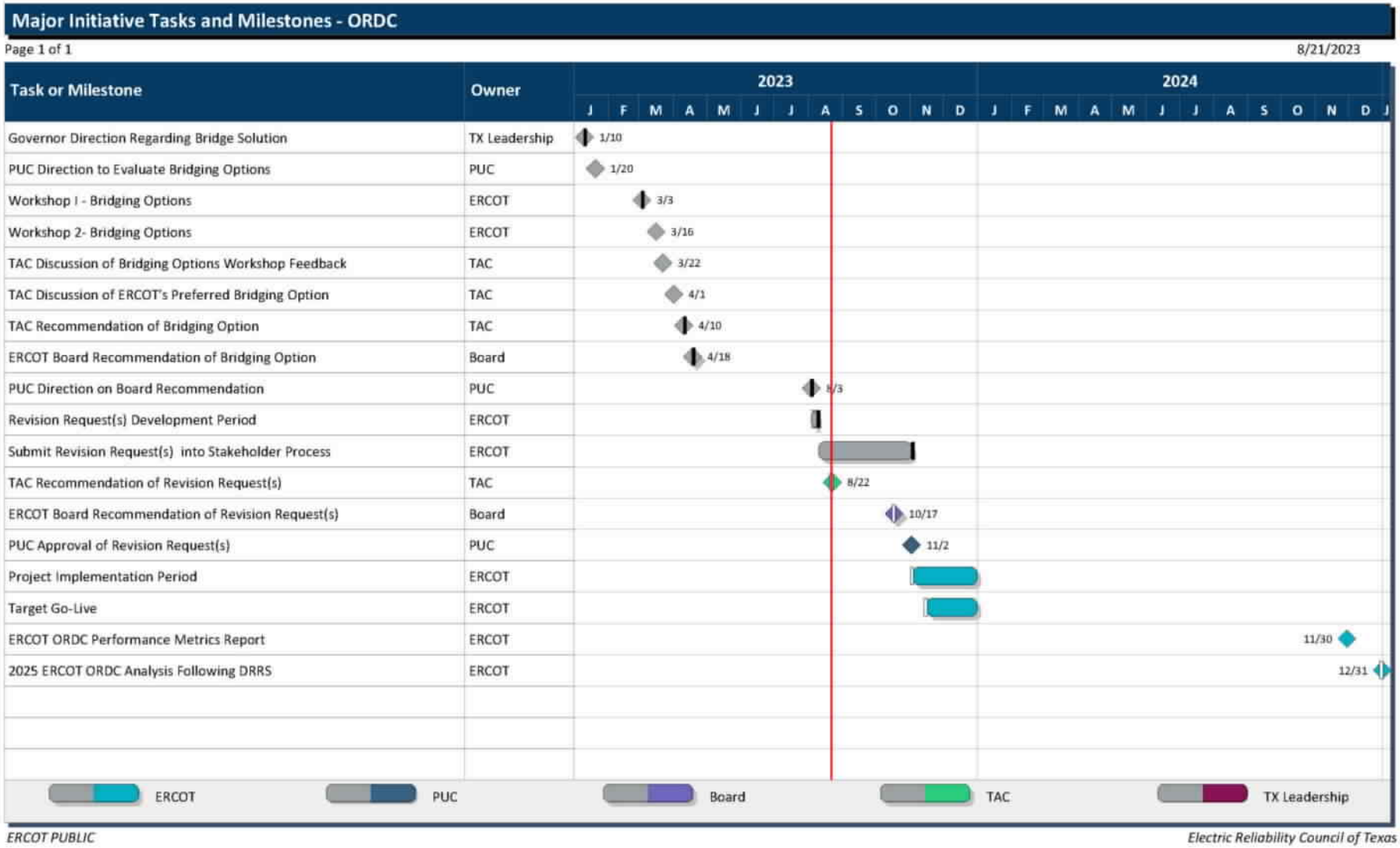
- ERCOT Board Resolution recommending ORDC enhancements (Apr. 18, 2023)
- OBDRR 048 and IA

Timeline


Major Initiative Tasks and Milestones - ORDC
Page 1 of 1
8/21/2023
Task or Milestone
Owner
2023
2024
J F M A M J J A S O N D J F M A M J J A S O N D J
Governor Direction Regarding Bridge Solution
TX Leadership
1/10
PUC Direction to Evaluate Bridging Options
PUC
1/20
Workshop I - Bridging Options
ERCOT
3/3
Workshop 2- Bridging Options
ERCOT
3/16
TAC Discussion of Bridging Options Workshop Feedback
TAC
3/22
TAC Discussion of ERCOT's Preferred Bridging Option
TAC
4/1
TAC Recommendation of Bridging Option
TAC
4/10
ERCOT Board Recommendation of Bridging Option
Board
4/18
PUC Direction on Board Recommendation
PUC
8/3
Revision Request(s) Development Period
ERCOT
Submit Revision Request(s) into Stakeholder Process
ERCOT
TAC Recommendation of Revision Request(s)
TAC
8/22
ERCOT Board Recommendation of Revision Request(s)
Board
10/17
PUC Approval of Revision Request(s)
PUC
11/2
Project Implementation Period
ERCOT
Target Go-Live
ERCOT
ERCOT ORDC Performance Metrics Report
ERCOT
11/30
2025 ERCOT ORDC Analysis Following DRRS
ERCOT
12/31
ERCOT
PUC
Board
TAC
TX Leadership
ERCOT PUBLIC
Electric Reliability Council of Texas

Market Initiative: Real-Time Co-optimization + Batteries (RTC+B)

Background

In October 2017, the Public Utility Commission of Texas (Commission) directed ERCOT and the Independent Market Monitor (IMM) to assess the potential benefits of the Real-Time Co-optimization (RTC) of energy and Ancillary Services in the wholesale electricity market. Following a robust investigation of the costs and benefits of RTC, the Commission directed ERCOT to begin the process of implementing RTC in January 2019.

- ERCOT worked with Commission Staff and the IMM to identify policy decisions that needed to be made by the Commission before work could begin on RTC design. The Commission provided direction on key items including Ancillary Service Demand Curves, the System-Wide Offer Cap, and Value of Lost Load in June 2019.
- Working with stakeholders, ERCOT created the Real-Time Co-Optimization Task Force (RTCTF) to address issues related to implementation. RTCTF developed a set of key policy and design principles to establish the scope of the RTC project. The key principles were approved in Q1 2020 and ERCOT moved forward with RTC Revision Requests for review in the stakeholder process.
- The ERCOT Board of Directors (ERCOT Board) approved the package of RTC Revision Requests in December 2020 and ERCOT initiated work on business requirements to guide the initiative.
- Given the extended implementation timeline, market, and technology changes since the original approval of RTC need to be considered. The installed capacity of batteries is expected to grow to over 14 GW in 2025. ERCOT has identified two core functionalities related to batteries, integration into core systems as a single-model Resource and state of charge (SOC) modeling, as functionality that should be delivered as enhancements to the RTC initiative.

The RTC+B initiative will provide operational and reliability benefits to the ERCOT system and economic benefits to end-use customers.

Scope

The implementation of RTC is a large-scale initiative that impacts multiple core ERCOT systems and the transition to RTC will have a ripple effect into other areas of ERCOT's pricing and operations.

- ERCOT has initiated a RTC program control project. The program re-start will analyze the business requirements and sub-projects needed to implement RTC. ERCOT is referring to the revised program as RTC plus Batteries (RTC+B).
- ERCOT has initiated the Revision Request process to address current reliability needs related to SOC (Nodal Protocol Revision Request (NPRR) 1186) during RTC+B development.
- The scope of RTC+B will include the original RTC functionality approved in December 2020 (NPRRs 1007-1013), along with single model batteries (NPRR 1014) and RTC SOC modeling for better awareness, accounting, and monitoring (NPRR TBD).
- The Technical Advisory Committee (TAC) will re-constitute a dedicated Task Force to support the implementation of RTC+B requirements. ERCOT will chair the RTC+B Task Force (RTCBTF) to coordinate and review the necessary ERCOT and stakeholder activities.

- RTCBTF will help to mitigate risk and support the successful implementation of the RTC+B through go-live. This will include coordinating timelines for interface requirements and testing, coordinating market readiness, and cutover activities.
- ERCOT will provide regular updates to the Commission, ERCOT Board, and TAC. Following the initiative planning phase, ERCOT will produce a revised cost estimate and timeline.
- ERCOT is targeting a go-live for RTC+B in 2026 between major releases of the Energy Management System (EMS) and Market Management System (MMS).

Key Milestones[1]

Development stage

- **March 2023** ERCOT began evaluating battery functionality in relation to current reliability needs and RTC market design. ERCOT developed Protocol language to improve the awareness, accounting, and monitoring of the SOC for a battery storage Resource in both the current market and with the delivery of RTC. ERCOT performed an Impact Analysis (IA) for both concepts to identify cost, resource, and system impacts.
- **June 2023** ERCOT filed NPRR 1186 through the stakeholder process to address SOC in the interim period before the RTC+B initiative goes live. ERCOT requested urgent status so that the associated system changes can be implemented in the narrow window before beginning development work on RTC+B. NPRR 1186 is the first of two NPRRs that ERCOT anticipates addressing SOC and requires minimal system changes so that the improvements can be in place while the RTC+B project is completed.
- **July 2023** ERCOT initiated the RTC+B control project. ERCOT anticipates that the RTC+B project planning phase will extend through April 2024.
- **August 2023** The RTCBTF charter is pending consideration at TAC. ERCOT anticipates the revised task force will start meeting in September 2023 and continue through RTB+B go live. RTC+B will meet until dissolved by TAC.
- **September 2023** ERCOT will bring draft Protocol language addressing RTC+B SOC for review at RTCBTF and will seek initial stakeholder feedback at that time. ERCOT will file a NPRR with urgent status to meet timelines for RTC+B program planning.

Approval stage

- **October 2023** ERCOT anticipates ERCOT Board consideration of NPRR 1186. Upon ERCOT Board approval, ERCOT will file the recommendation with the Commission.
- **November 2023** ERCOT anticipates Commission consideration of NPRR 1186. Upon Commission approval, ERCOT will work to implement the interim SOC solution in 2024.
- **December 2023** ERCOT anticipates ERCOT Board consideration of the RTC+B SOC NPRR. Upon ERCOT Board approval, ERCOT will file the recommendation with the Commission.
- **January 2024** ERCOT anticipates Commission consideration of the RTC+B SOC NPRR. Upon Commission approval, ERCOT will purpose a change request approval to add SOC to RTC+B.

Implementation stage

- **January 2024** ERCOT will begin key vendor development efforts.
- **2026** RTC+B system changes and final program delivery are targeted for a 2026 release.

[1] Projected milestones are subject to change.

Key Documents and References

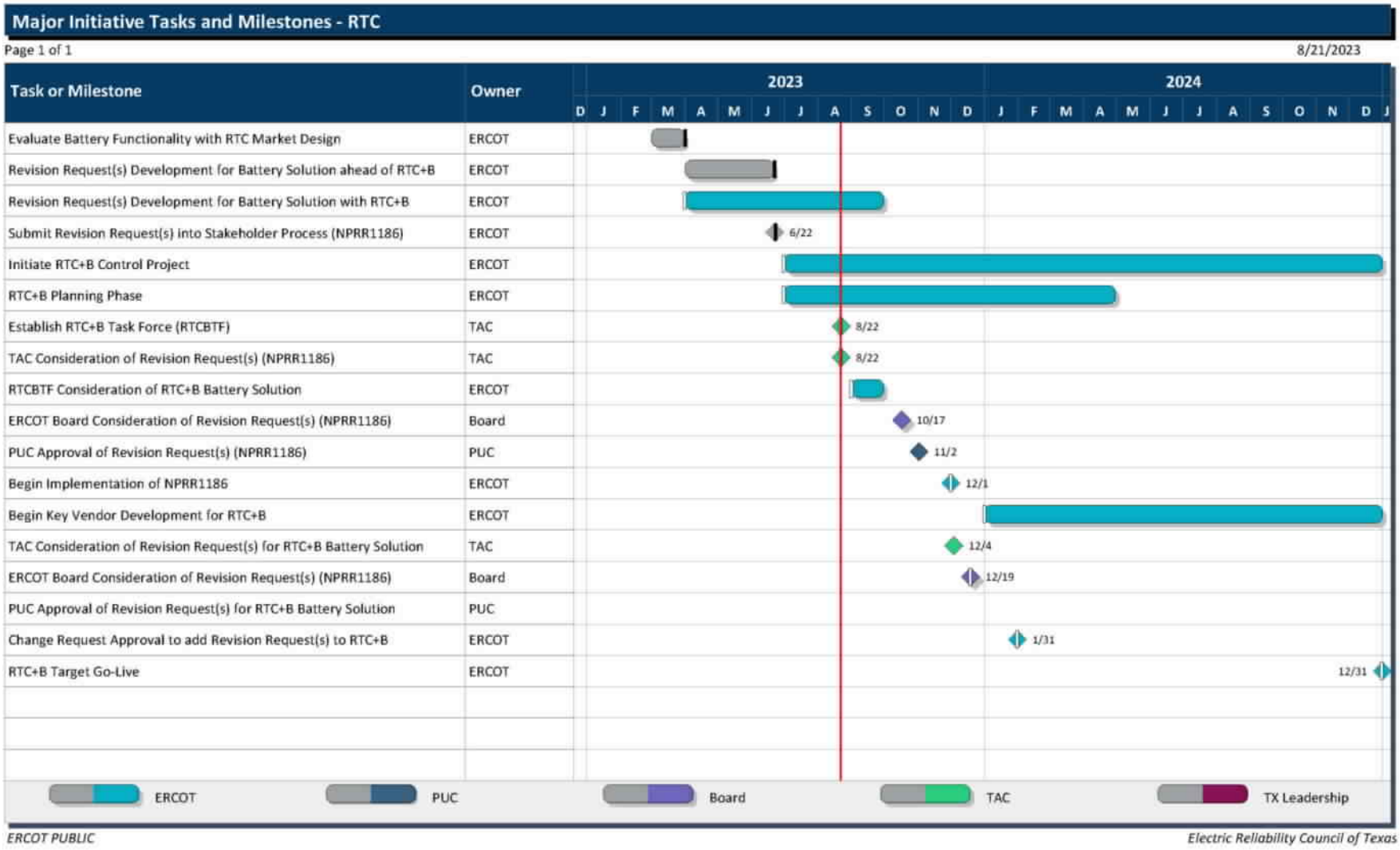
Commission

- PUCT Project No. 47199
  - ERCOT Study on benefits of RTC (June 29, 2018)
  - IMM Study and Simulation of RTC of Energy and Ancillary Services (June 29, 2018)
- PUCT Project No. 48540

ERCOT

- PUCT Directives - Real-Time Co-Optimization
- RTC Revision Requests:
  - NPRR 1007, NPRR 1008, NPRR 1009, NPRR 1010, NPRR 1011, NPRR 1012, NPRR 1013
  - NPRR 1014 and IA
  - NPRR 1186 and IA

Timeline


Major Initiative Tasks and Milestones - RTC
Page 1 of 1
8/21/2023
Task or Milestone
Owner
2023
2024
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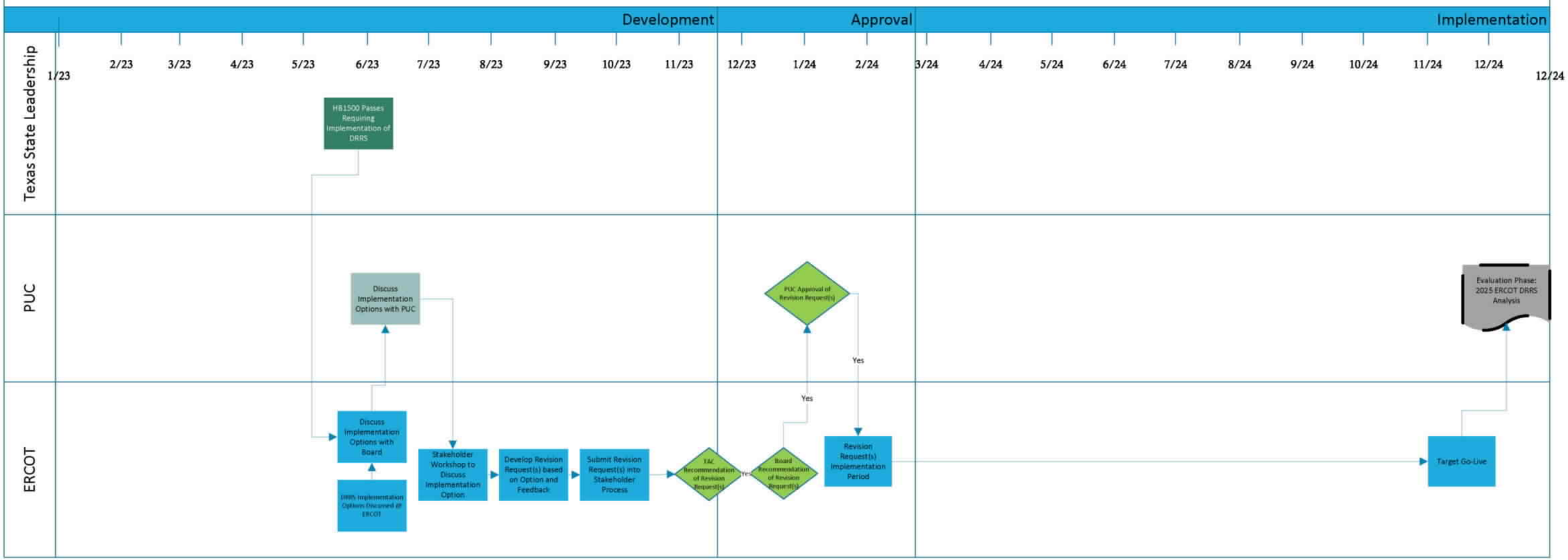
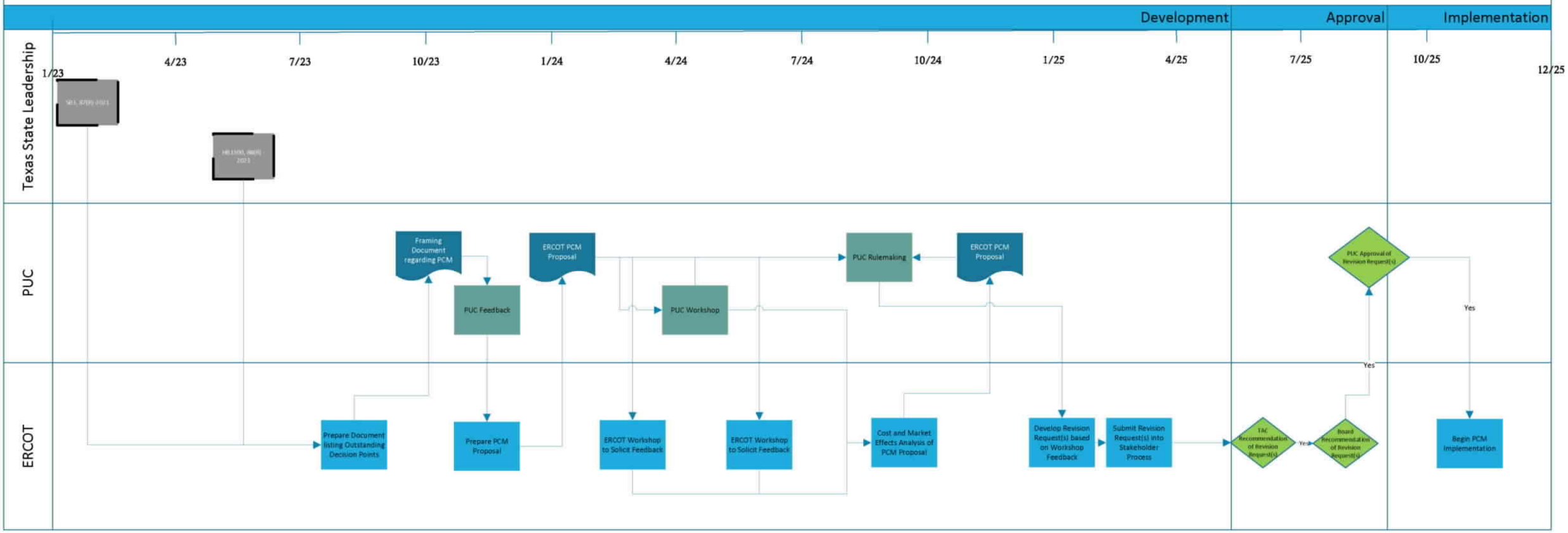
Evaluate Battery Functionality with RTC Market Design ERCOT
Revision Request(s) Development for Battery Solution ahead of RTC+B ERCOT
Revision Request(s) Development for Battery Solution with RTC+B ERCOT
Submit Revision Request(s) into Stakeholder Process (NPRR1186) ERCOT 6/22
Initiate RTC+B Control Project ERCOT
RTC+B Planning Phase ERCOT
Establish RTC+B Task Force (RTCBTF) TAC 8/22
TAC Consideration of Revision Request(s) (NPRR1186) TAC 8/22
RTCBTF Consideration of RTC+B Battery Solution ERCOT
ERCOT Board Consideration of Revision Request(s) (NPRR1186) Board 10/17
PUC Approval of Revision Request(s) (NPRR1186) PUC 11/2
Begin Implementation of NPRR1186 ERCOT 12/1
Begin Key Vendor Development for RTC+B ERCOT
TAC Consideration of Revision Request(s) for RTC+B Battery Solution TAC 12/4
ERCOT Board Consideration of Revision Request(s) (NPRR1186) Board 12/19
PUC Approval of Revision Request(s) for RTC+B Battery Solution PUC
Change Request Approval to add Revision Request(s) to RTC+B ERCOT 1/31
RTC+B Target Go-Live ERCOT 12/31
ERCOT
PUC
Board
TAC
TX Leadership
ERCOT PUBLIC
Electric Reliability Council of Texas

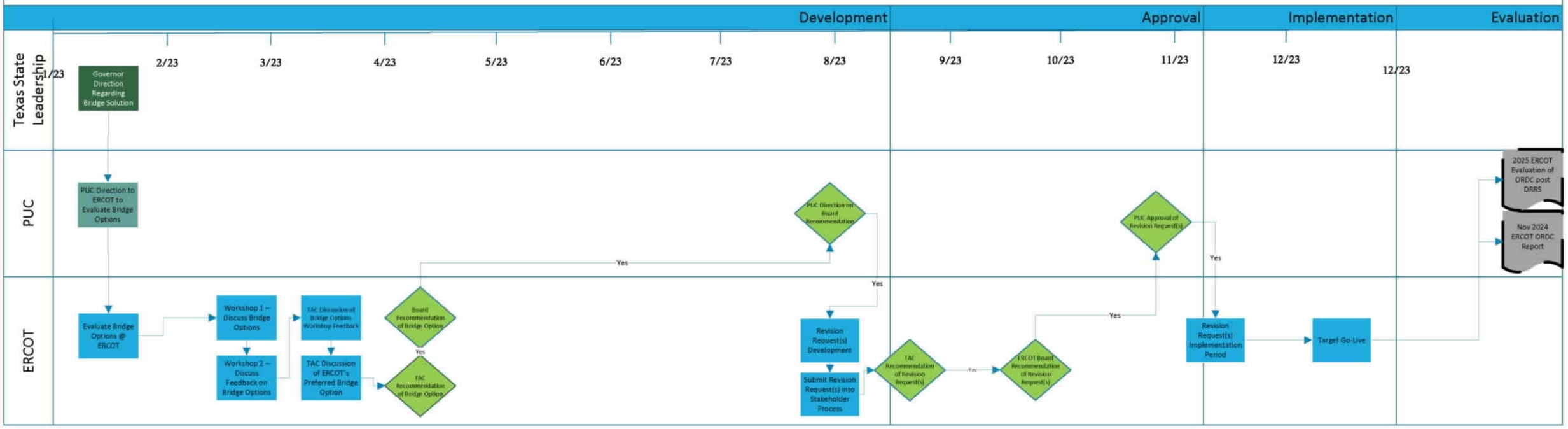
Dispatchable Reliability Reserve Service (DRRS)



Performance Credit Mechanism (PCM)



Operating Reserve Demand Curve Enhancement (Bridge Solution)



Real Time Co-optimization + Battery (RTC+B)

Development | Approval | Implementation

Texas State Leadership

1/23 2/23 3/23 4/23 5/23 6/23 7/23 8/23 9/23 10/23 11/23 12/23 1/24 2/24 3/24 4/24 5/24 6/24 7/24 8/24 9/24 10/24 11/24 12/24 12/24

PUC

ERCOT

Evaluate Battery Functionality with RTC Market Design

Revision Request(s) Development for Battery Solution with RTC+B

Revision Request(s) Development for Battery Solution ahead of RTC+B (NPRR1186)

RTCBTF Consideration of RTC+B Battery Solution

Submit Revision Request(s) into Stakeholder Process (NPRR1186)

Submit Revision Request(s) into Stakeholder Process for RTC+B SOC

TAC Recommendation of NPRR1186

Yes

Board Recommendation of NPRR1186

Yes

TAC Recommendation of RTC+B SOC

Yes

Board Recommendation of RTC+B SOC

Yes

PUC Approval of NPRR1186

PUC Approval of RTC+B SOC

Change Request Approval to add RTC+B SOC to RTC+B scope

Begin Implementation of NPRR1186

Initiate RTC+B Control Project

RTC+B Planning Phase

Establish RTB=C Task Force

Begin Key Vendor Development for RTC+B

Continue RTC+B Implementation

2026 RTC+B Target Go-Live